

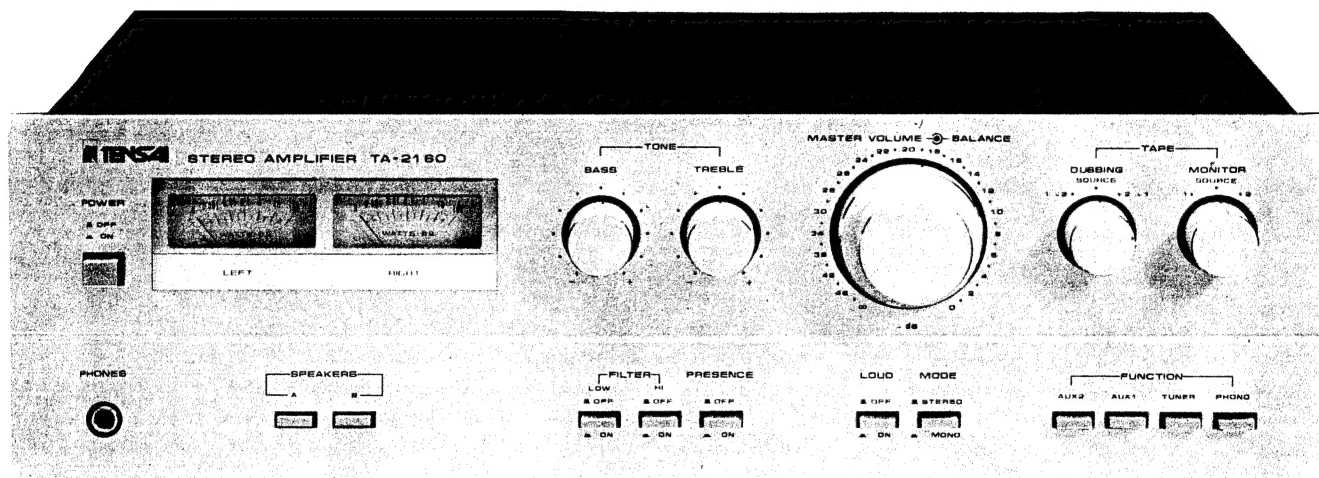
TA-2160

60W PRE-MAIN AMPLIFIER



TENSAI

INTERNATIONAL



Service Manual

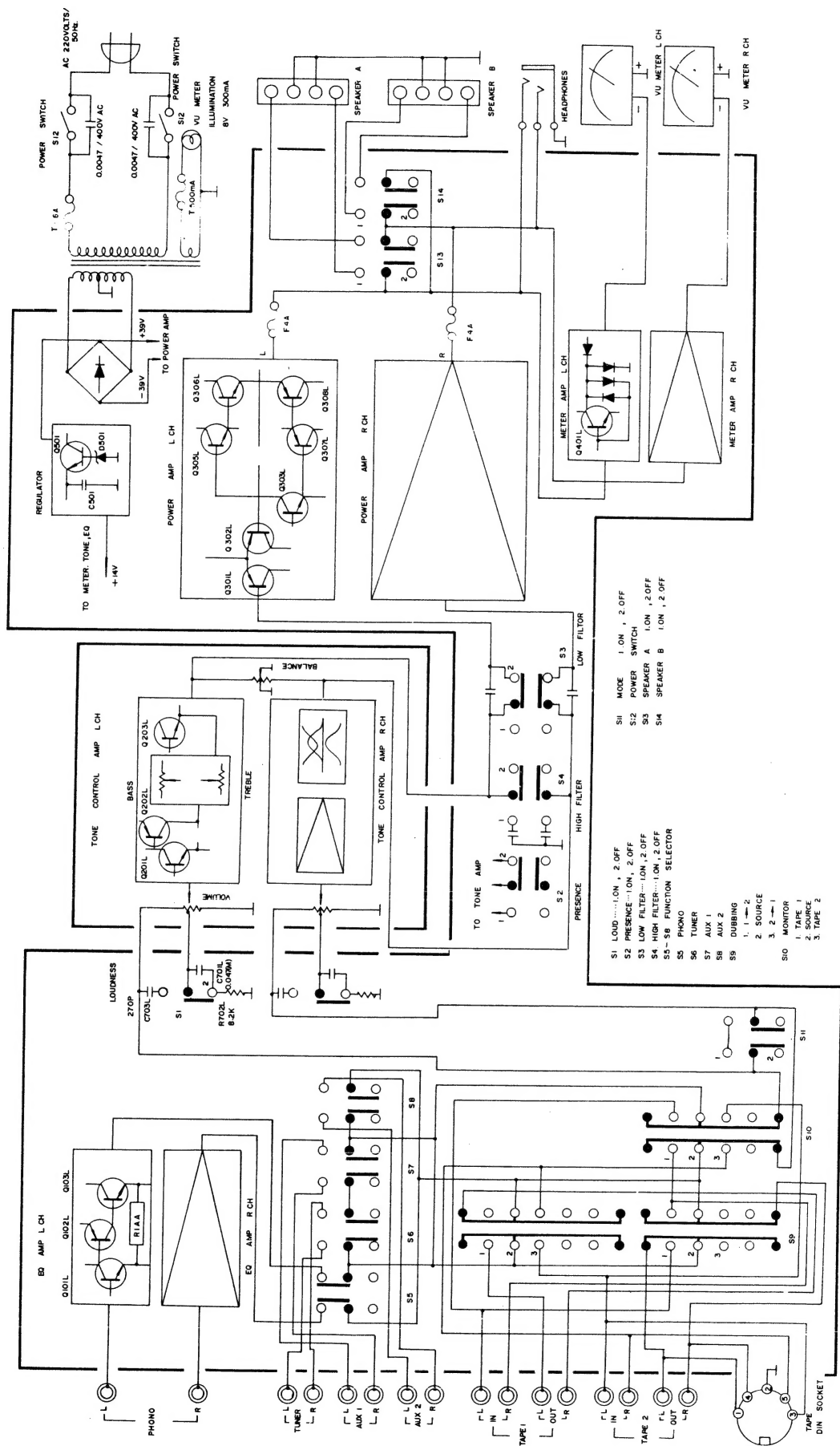
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SPECIFICATIONS

POWER OUTPUT, continuous RMS with no more than 0.1% THD.	
at 8 ohms, 1 KHz	50W
at 4 ohms, 1 KHz	60W
THD at 1 KHz half power	0.05%
IMD at 300 Hz: 7 KHz = 4:1, half power	0.05%
POWER BANDWIDTH at half power	10Hz-45KHz
DAMPING FACTOR at 1 KHz, 8 ohms	30
S/N RATIO, CCIR weighted/Unweighted	
Tuner/Aux/Tape	95/90 dB
Phono	80/70 dB
INPUT SENSITIVITY/IMPEDANCE for 50W output	
Tuner/Aux/Tape	160mV/47 Kohm
Phono	2.5mV/47 Kohm
PHONO INPUT OVERLOAD at 1 KHz, 0.1% THD	120mV
TONE CONTROLS, Bass at 100 Hz, Treble at 10 KHz	± 10dB
LOUDNESS BOOST at 100 Hz/10 KHz	+8/ +6 dB
PRESENCE BOOST at 1 KHz	+ 5 dB
HIGH FILTER at 10 KHz	— 3 dB
LOW FILTER at 100 Hz	— 3 dB
CHANNEL SEPARATION at 1 KHz	55 dB
INPUT CROSSTALK at 10 KHz	70 dB
POWER CONSUMPTION at rated output	300W
at no signal	20W
UNIT DIMENSION (W x H x D)	430 x 136 x 319 mm
UNIT WEIGHT	8.3 Kg

BLOCK DIAGRAM



ELECTRICAL ADJUSTMENT PROCEDURE

STEP	ALIGNMENT	CONNECTIONS	ADJUST	ADJ. FOR	REMARKS
1	BIAS CURRENT ADJ. L-CH	CONNECT DC MV METER BETWEEN EMITTERS OF POWER TRANSISTORS (Q306L&Q308L) AS SHOWN IN FIG 1.	VR301L	DC16MV ±2MV	1. SET VOLUME CONTROL TO MINIMUM. 2. FOR ADJUSTMENT, WAIT 10 MINUTES AFTER THE POWER SWITCH IS TURNED ON. 3. THIS BIAS CURRENT ADJUSTMENT CONVERTS CURRENT VALUE INTO VOLTAGE BY OHM'S LAW ($\approx 30\text{MA}$).
2	BIAS CURRENT ADJ. R-CH	CONNECT DC MV METER BETWEEN EMITTERS OF POWER TRANSISTORS (Q306R & Q308R) AS SHOWN IN FIG 1.	VR301R		
3	VU METER OUTPUT LEVEL ADJ. L-CH	CONNECT 1KHZ INPUT TO AUX IL CH AND INCREASE VOLUME UNTIL 10W OUTPUT INTO 8 OHMS LOAD IS MEASURED AS SHOWN IN FIG 2.	VR401L	10W SCALE OF VU METER	1. SET TONE AND BALANCE CONTROLS TO CENTER POSITION. 2. SET FUNCTION SELECTOR TO AUX 1 POSITION. 3. SET ALL FILTERS TO OFF POSITION.
4	VU METER OUTPUT LEVEL ADJ. R-CH	CONNECT 1KHZ INPUT TO AUX IR CH AND INCREASE VOLUME UNTIL 10W OUTPUT INTO 8 OHMS LOAD IS MEASURED AS SHOWN IN FIG 2.	VR401R		

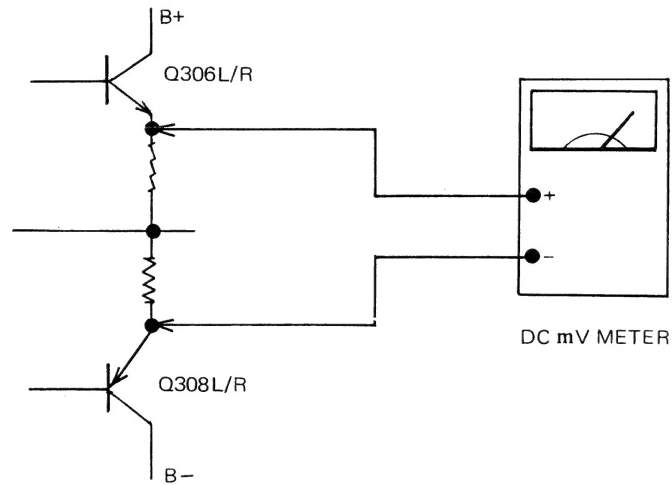


Fig. 1. Bias Current Adjustment

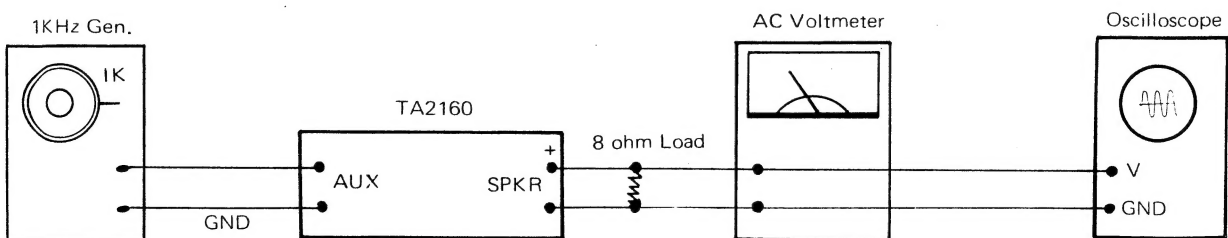
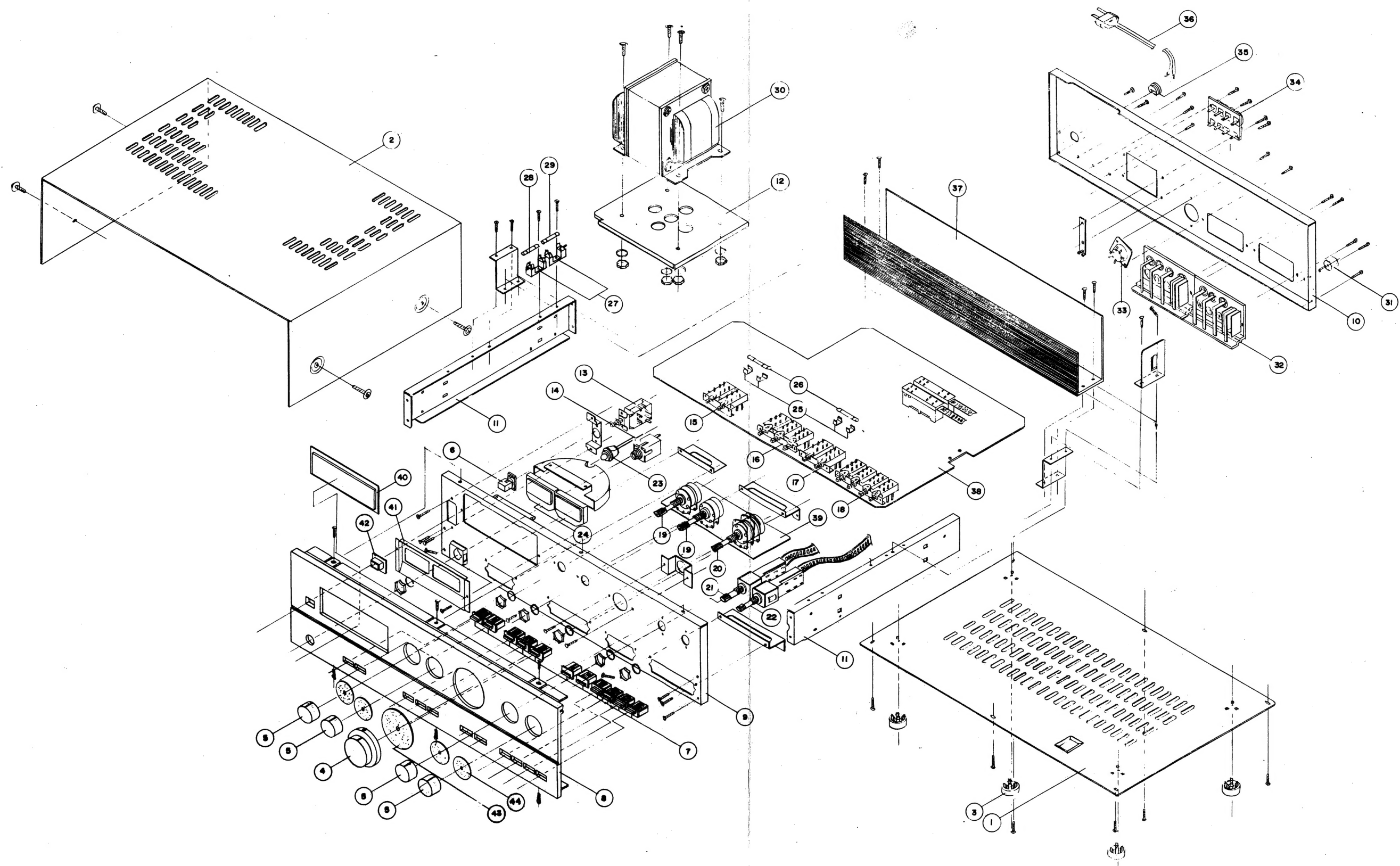


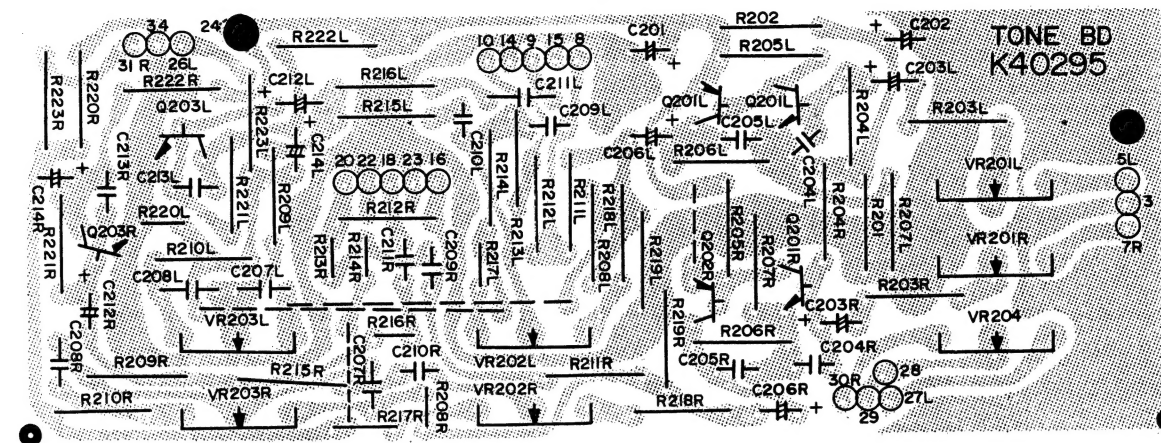
Fig. 2. VU Meter level adjustment

EXPLODED VIEW OF CABINET AND CHASSIS

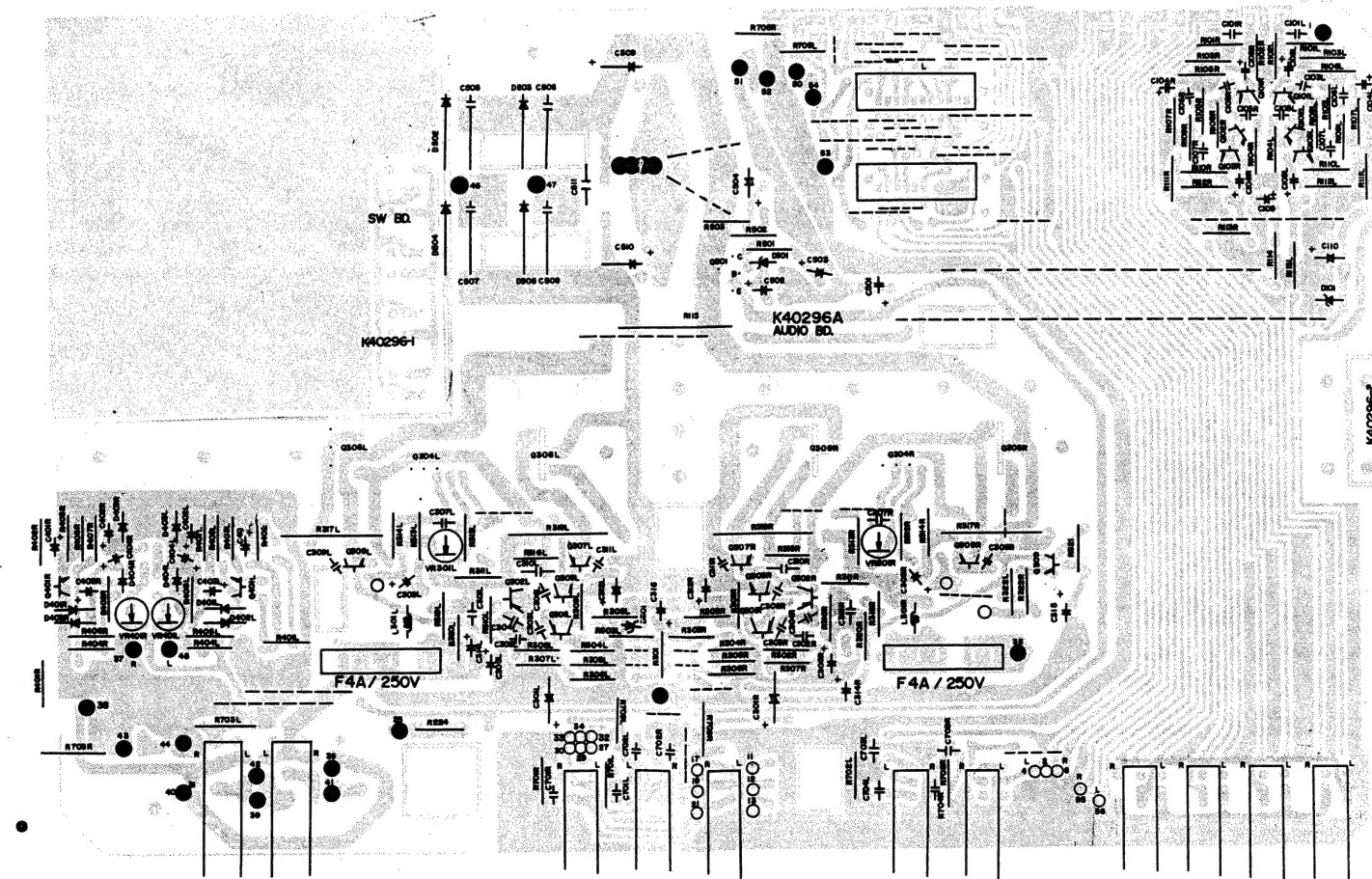


TOP VIEW OF P.C. BOARDS

TONE CONTROL PCB PARTS LOCATION (K40295)



AUDIO AMP PCB PARTS LOCATION (K40296)



PARTS LIST

Ref. No.	Parts No.	Description	Q'ty
PACKING PARTS LIST			
	PE-74172-02	Inner Box	1
	PE-74066	Poly Bag	1
	PC-74171	Cushion (Right & Left)	2
ACCESSORY PARTS LIST			
	96033-1	Operation Manual	1
	96000-10	Product-Certificate Card	1
CABINET PARTS LIST			
1	PC-62242	Bottom Cover	1
2	PC-62243	Cabinet	1
3	AD-71045	Foot Ass'y	4
APPEARANCE PARTS LIST			
4	AD-72174	Double Knob Ass'y	1
5	PE-72173	Control Knob	4
6	AE-72171	Push Knob Ass'y (Power)	1
7	AE-72170	Push Knob Ass'y (Function)	11
8	AC-61076	Front Panel Ass'y	1
CHASSIS PARTS LIST			
9	PC-62241	Front Chassis	1
10	PC-62244	Back Chassis	1
11	PD-62240	Main Frame	2
12	PD-68049	Trans B.K.T.	1
ELECTRICAL PARTS LIST			
13	PE-95055	Power SW(SDG 5P E)	1
14	PE-95035	Phone Jack	1
15	PE-90091	Speaker Push SW	1
16	PE-90190	3 gang Push SW (Filters)	1
17	PE-90192	2 gang Push SW (Speaker)	1
18	PD-90189	4 gang Push SW (Function)	1
19	PE-15084	Potentiometer (Tone)	2
20	PD-15085	Potentiometer (VOL/BAL)	1
21	AE-90197	Remote SW Ass'y (Dubbing)	1
22	AE-90198	Remote SW Ass'y (Monitor)	1
23	AE-64058	Lamp (Pilot&Meter)	1
24	PE-75028	Meter VU (Power Level)	2
25	PE-69094	Fuse Clip (20m/m)	4
26		Fuse (F4A/250V) Speaker	2
27	PE-69096	Fuse Holder (20m/m)	2
28		Fuse (T500mA/250V) Lamp	1
29		Fuse (T 1 6A /250V) Pri	1
30	PD-35072	Power Transformer	1
31	PD-70005	System Ground	1
32	PE-95052	RCA Jack (8P)	2
33	PE-90066	Din Connector	1
34	PE-76006	Speaker Terminal (4P)	1
35	PD-71008A	AC Cord Stopper	1
36	PE-67051	AC Cord	1
37	PC68404	Heat Sink, (Power)	1
38	K40296	Audio B'd Ass'y	1
39	K40295	Tone B'd Ass'y	1
FRONT PANEL ASS'Y PARTS LIST			
8	PC-61076	Front Panel	1
40	PE-63074	Meter Window	1
41	PE-63075	Meter Plate	1
42	PE-72172	Push SW Power Bezel	1
43	PE-72176	Double Knob Felt	1
44	PE-72175	Control Knob Felt	4
TONE PCB ASS'Y K40295			
SEMICONDUCTORS			
J201L/R		T R MPS9633C	2
J202L/R		T R 2SA841BL	2
J203L/R		T.R MPS9633C	2
CAPACITORS			

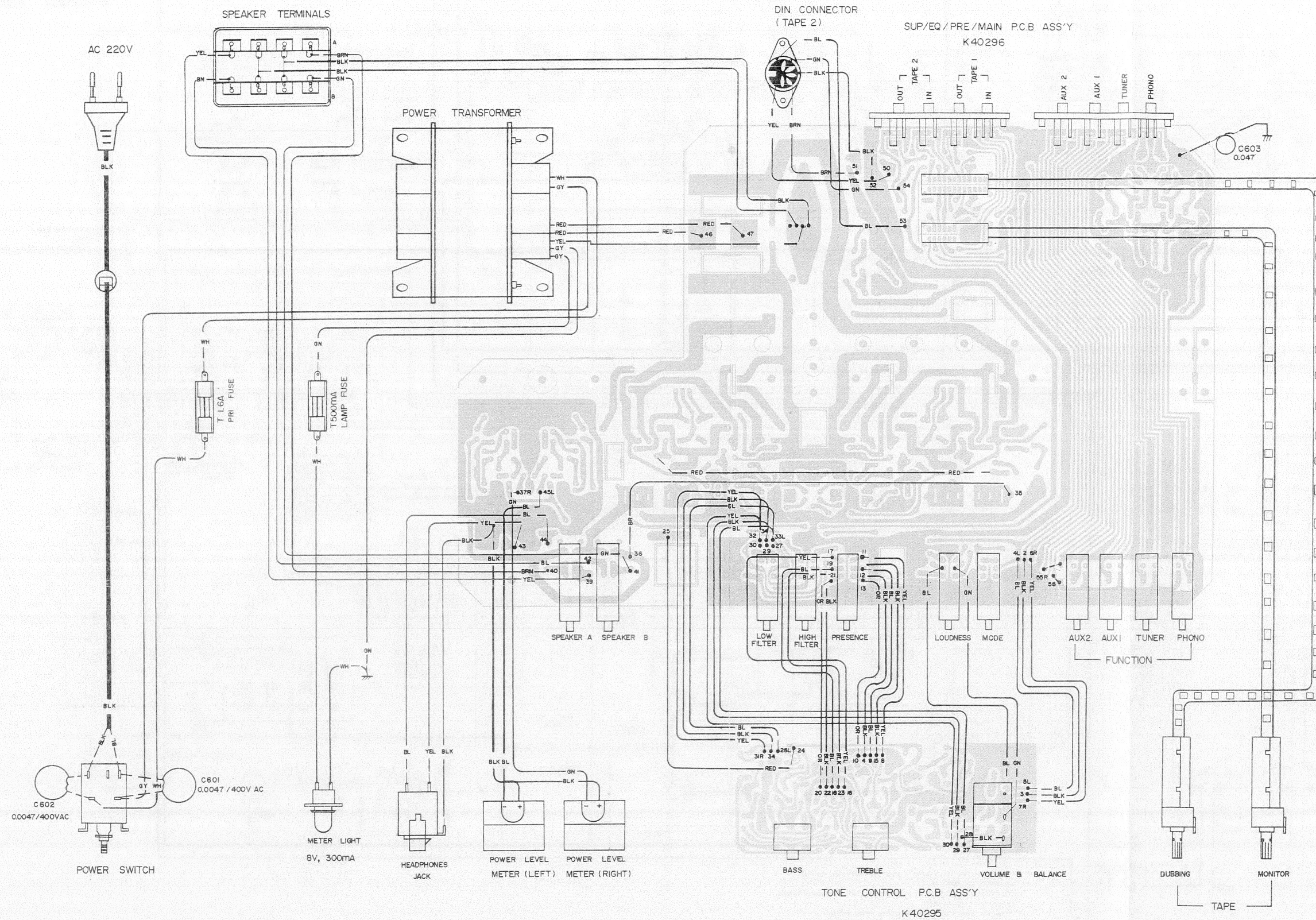
Ref. No.	Parts No.	Description	Q'ty
C201	50AL101 16E	Elect 100μF 16V	1
C202	50AL100 16E	Elect 10μF 16V	1
C203L/R	50AS478 16E	Al-Solid 0.47μF 16V	2
C204L/R	50CE101 50K	Ceramic 100PF 50V	4
C205L/R			
C206L/R	50AL479 16E	Elect 4.7μF 16V	2
C207L/R			
C208L/R	50MY473 50J	Mylar 0.047μF 50V	4
C209L/R	50MY103 50J	Mylar 0.01μF 50V	2
C210L/R	50MY152 50J	Mylar 0.0015μF 50V	2
C211L/R	50MY472 50J	Mylar 0.0047μF 50V	2
C212L/R	50AS109 16E	Al-Solid 1μF 16V	2
C213L/R	50CE680 50J	Ceramic 68PF 50V	2
C214L/R	50AL479 16E	Elect 4.7μF 16V	2
RESISTORS			
R201	60F822 ¼J	Carbon 8.2K ¼W J	1
R202	60F472 ¼J	Carbon 4.7K ¼W J	1
R203L/R	60F102 ¼J	Carbon 1K ¼W J	2
R204L/R	60F474 ¼J	Carbon 470K ¼W J	2
R205L/R	60F123 ¼J	Carbon 12K ¼W J	2
R206L/R	60F132 ¼J	Carbon 1.3K ¼W J	2
R207L/R	60F271 ¼J	Carbon 270 ¼W J	2
R208L/R	60F103 ¼J	Carbon 10K ¼W J	2
R209L/R	60F223 ¼J	Carbon 22K ¼W J	2
R210L/R	60F103 ¼J	Carbon 10K ¼W J	2
R211L/R	60F822 ¼J	Carbon 8.2K ¼W J	2
R212L/R			
R213L/R	60F473 ¼J	Carbon 47K ¼W J	4
R214L/R	60F822 ¼J	Carbon 8.2K ¼W J	2
R215L/R			
R216L/R	60F392 ¼J	Carbon 3.9K ¼W J	4
R217L/R			
R218L/R	60F472 ¼J	Carbon 4.7K ¼W J	4
R219L/R			
R220L/R	60F124 ¼J	Carbon 120K ¼W J	4
R221L/R	60F824 ¼J	Carbon 820K ¼W J	2
R222L/R	60F472 ¼J	Carbon 4.7K ¼W J	2
R223L/R	60F102 ¼J	Carbon 1K ¼W J	2
R224	60F470 ¼J	Carbon 47 ¼W J	1
AUDIO PCB ASS'Y K40296			
EQ SECTION			
SEMICONDUCTORS			
Q101L/R		T R MPS9633C	2
Q102L/R		T R 2SA841BL	2
Q103L/R		T R MPS9633C	2
D101		Zener Diode, BZY88C20	1
CAPACITORS			
C101L/R	50CE221 50J	Ceramic 220PF 50V	2
C102L/R	50AL100 50J	Elect 10μF 16V	2
C103L/R	50CE101 50K	Ceramic 100PF 50V	2
C104L/R	50AL470 16E	Elect 47μF 16V	2
C105L/R	50CE200 50J	Ceramic 20PF 50V	2
C106L/R	50MY222 50J	Mylar 0.0022μF 50V	2
C107L/R	50MY822 50J	Mylar 0.0082μF 50V	2
C108L/R	50AL79 16E	Elect 4.7μF 16V	2
C109	50AL101 16E	Elect 100μF 16V	1
C110	50AL102 25F	Elect 1000μF 25V	1
RESISTORS			
R101L/R	60F154 ¼J	Carbon 150K ¼W J	2
R102L/R	60F681 ¼J	Carbon 680 ¼W J	2
R103L/R	60F683 ¼J	Carbon 68K ¼W J	2
R104L/R	60F153 ¼J	Carbon 15K ¼W J	2
R105L/R	60F333 ¼J	Carbon 33K ¼W J	2
R106L/R	60F681 ¼J	Carbon 680 ¼W J	2
R107L/R	60F124 ¼J	Carbon 120K ¼W J	2
R108L/R	60F562 ¼J	Carbon 5.6K ¼W J	2
R109L/R	60F394 ¼J	Carbon 390K ¼W J	2
R110L/R	60F681 ¼J	Carbon 680 ¼W J	2

PARTS LIST

Ref. No.	Parts No.	Description	Q'ty
R111L/R	60F332-¼J	Carbon 3.3K ¼W J	2
R112L/R	60F473 ¼J	Carbon 47K ¼W J	2
R113L/R	60F102-¼J	Carbon 1K ¼W J	2
R114	60F470-¼J	Carbon 47 ¼W J	1
R115	60M561-1K	Oxide Metal Film 560 1W K	1
POWER SECTION			
SEMICONDUCTORS			
Q301L/R		T.R. 2SA841BL	4
Q302L/R		T.R. MPS.L01	2
Q303L/R		T.R. CS9013H.G	2
Q304L/R		T.R. MPS A06	2
Q305L/R		T.R. 2SD718	2
Q306L/R		T.R. MPS A56	2
Q307L/R		T.R. 2SB688	2
Q308L/R		T.R. MPS A06	1
Q309			
D301		Zener, Diode BZY88C20	1
CAPACITORS			
C301L/R	50AS109-16E	Al-Solid 1µF 16V	2
C302L/R	50CE471-50J	Ceramic 470µF 50V	2
C303L/R	50CE101-50J	Ceramic 100PF 50V	4
C304L/R			
C305L/R	50AL220-16E	Elect 22µF 16V	2
C306L/R	50CE200-50J	Ceramic 20PF 50V	2
C307L/R	50CE473-50J	Ceramic 0.047µF 50V	2
C308L/R	50AL220-35E	Elect 22µF 35V	2
C309L/R	50CE101-50J	Ceramic 100PF 50V	2
C310L/R	50MY104-50J	Mylar 0.1µF 50V	2
C311L/R	50CE101-50J	Ceramic 100PF 50V	2
C312L/R	50AL109-50E	Elect 1µF 50V	2
C313L/R	50CE473-50J	Ceramic 0.047µF 50V	2
C314L/R	50AL109-50E	Elect 1µF 50V	2
C315	50AL470-50E	Elect 47µF 50V	1
C316	50AL101-25E	Elect 100µF 25V	1
RESISTORS			
R301	60F392 ¼J	Carbon 3.9K ¼W J	1
R302L/R	60F102-¼J	Carbon 1K ¼W J	2
R303L/R	60F824-¼J	Carbon 820K ¼W J	2
R304L/R	60F563-¼J	Carbon 56K ¼W J	2
R305L/R	60F182-¼J	Carbon 1.8K ¼W J	4
R306L/R			
R307L/R	60F102-¼J	Carbon 1K ¼W J	2
R308L/R	60F103-¼J	Carbon 10K ¼W J	2
R309L/R	60F122-¼J	Carbon 1.2K ¼W J	2
R310L/R	60F272-¼J	Carbon 2.7K ¼W J	2
R311L/R	60F683-¼J	Carbon 68K ¼W J	2
R312L/R	60F152-¼J	Carbon 1.5K ¼W J	2
R313L/R	60F392 ¼J	Carbon 3.9K ¼W J	2
R314L/R	60F562-¼J	Carbon 5.6K ¼W J	2
R316L/R	60M271-1K	Oxide Metal Film 270 1W K	2
R317L/R	60W278-3K	Cement 0.27 3W K	4
R318L/R			
R319L/R	60F339-¼WJ	Carbon 3.3 ¼W J	2
R320L/R	60F100-½WK	Oxide Metal film 10 ½W J	2
R321	60F333-¼J	Carbon 33K ¼W J	2
R322L/R	60F152-¼J	Carbon 1.5K ¼W J	2
V.R.301L/R	PE-16004	Semifixed. 2.2K (B)	2
COILS			
L301L/R	PE-30045	Coil 2.7µH	2
METER SECTION			
SEMICONDUCTORS			
Q401L/R		T.R. CS9013H.G	2
D401L/R		Diode, CDG24	4
D402L/R			

Ref. No.	Parts No.	Description	Q'ty
D403L/R D404L/R		Diode, 1N60	4
CAPACITORS			
C401L/R	50AI109-50E	Elect 1μF 50V	2
C402L/R	50AI100-50E	Elect 10μF 50V	2
C403L/R C404L/R	50AI109-50E	Elect 1μF 50V	4
RESISTORS			
R401L/R	60F473-¼J	Carbon 47K ¼W J	2
R402L/R	60F123-¼J	Carbon 12K ¼W J	2
R403L/R	60F822-¼J	Carbon 8.2K ¼W J	2
R404L/R	60F154-¼J	Carbon 150K ¼W J	2
R405L/R	60F223-¼J	Carbon 22K ¼W J	2
R406L/R	60F472-¼J	Carbon 4.7K ¼W J	2
R407L/R	60F681-¼J	Carbon 680 ¼W J	2
R408L/R	60F132-¼J	Carbon 1.3K ¼W J	2
V.R.401 L/R	PE-16000	Semifixed. 4.7K(B)	2
SUPPLY SECTION			
SEMICONDUCTORS			
Q501 D501 D502, 503 D505, 505	P-300D	T.R. 2SD880 Zener, Diode MZ-314 Diode, 3A/200V	1 1 4
CAPACITORS			
C501 C502 C503 C504 C505, 506 C507, 508 C509 C510	50AI101-16E 50AI102-16E 50AI471-35E 50CE103-500J 60A 1472-50E	Elect 100μF 16V Elect 1000μF 16V Elect 470μF 35V Ceramic 0.01μF 500V Elect 4700μF 50V	2 2 1 4 2
RESISTORS			
R501 R502 R503	60F331-¼J 60F102-¼J 60F101-¼J	Carbon 330¼W ¼W J Carbon 1K ¼W J Carbon 100 ¼W J	1 1 1
CHASSIS			
CAPACITORS			
C601 C602	ECK-DHS472MD4	Ceramic 0.0047μF 400V AC	2
PRE. DIN SECTION			
CAPACITORS			
C701L/R C702L/R C703L/R C704L/R	50MY333-50J 50MY153-50J 50CE471-50J 50CE473-50J	Mylar 0.033μF 50V Mylar 0.015μF 50V Ceramic 470PF 50V Ceramic 0.047μF 50V	2 2 2 2
RESISTORS			
R701L/R R702L/R R703L/R	60F105-¼W J 60F822-¼W J 60M271-2WK	Carbon 1M ¼W J Carbon 8.2K ¼W J Oxide Metal Film 270 2W K	2 2 2
R705L/R R709L/R	60F334-¼W J 60F105-¼W J	Carbon 330K ¼W J Carbon 1M ¼W J	2 2
P.C.B			
	K40296 K40295	Audio B'd Tone B'd	1 1

POINT TO POINT WIRING DIAGRAM



SCHEMATIC DIAGRAM



MODEL TA 2160

STEREO AMPLIFIER

